

Claims

1. An electron optical lens column characterized by comprising a column unit and an electrostatic lens disposed inside of said column unit and by the fact that the inner surface of said column unit is given high-resistance electrical conductivity.
2. The electron optical lens column according to Claim 1, characterized by the fact that the inner surface of said column unit is formed from a ceramic having high-resistance electrical conductivity.
3. The electron optical lens column according to Claim 1, characterized by the fact that said column unit is formed from, essentially, a single material.
4. The electron optical lens column according to Claim 3, characterized by the fact that said single material is a ceramic that has high-resistance electrical conductivity.
5. The electron optical lens column according to any one of Claims 1 through 4, characterized by the fact that said high-resistance electrical conductivity is in such a state that the resistivity is in the range of 10^8 to 10^{10} Ω -cm.
6. The electron optical lens column according to any one of Claims 1 through 5, characterized by the fact that said column unit has an inner column and an outer column, and that said inner column is disposed on the inside of said outer column.
7. The electron optical lens column according to Claim 6, characterized by the fact that said electrostatic lens comprises electrodes used to produce an electric field within said column unit, that said electrodes are connected to interconnections used to apply voltages to said electrodes, and that said interconnections are disposed between said inner column and said outer column.
8. The electron optical lens column according to Claim 7 comprises a plurality of said electrodes and is further characterized by the fact that said electrodes with identical electric potentials are mutually connected via said interconnections.

9. The electron optical lens column according to Claim 7 comprises a plurality of said electrodes and is further characterized by the fact that said interconnections connect together via resistances or switching elements electrodes that have different electric potentials.
10. The electron optical lens column according to any one of Claims 1 to 6, characterized by the fact that said electrostatic lens comprises electrodes for generating electric fields on the inside of said column unit, and that said electrodes are attached to the inner surface of said column unit.
11. The electron optical lens column according to any one of Claims 1 to 6 comprises a plurality of said electrostatic lenses, and is further characterized by the fact that the electrodes equipped for each electrostatic lens comprise multiple electrode parts that are mutually separate, and that the number of electrode parts in each of said electrodes is identical.
12. The electron optical lens column according to any one of Claims 1 to 6 comprises a plurality of said electrostatic lenses, and is further characterized by the fact that each of said electrostatic lenses comprises electrodes, that said electrodes comprise multiple electrode parts that are mutually separate, and that those electrode parts that have identical electric potentials are connected together electrically via interconnections.
13. The electron optical lens column according to Claim 1, characterized by the fact that said column unit has an inner column and an outer column, that said inner column is disposed inside said outer column, that said column unit comprises a plurality of said electrostatic lenses, that said electrostatic lenses comprise electrodes for generating electric fields on the inside of said column unit, that said electrodes are attached to the inner surface of said column unit, that said electrodes are equipped with a plurality of electrode parts that are mutually separate, that said electrode parts that have identical electric potentials are mutually connected electrically via interconnections, and that said interconnections are disposed between said inner column and said outer column.
14. The electron optical lens column according to Claim 1, characterized by the fact that said column unit has an inner column and an outer column, that said inner column is disposed inside said outer column, that said column unit comprises a plurality of said electrostatic lenses, that said electrostatic lenses comprise electrodes for generating electric fields on the inside of said

column unit, that said electrodes are attached to the inner surface of said column unit, that said electrodes are equipped with a plurality of electrode parts that are mutually separate, that said electrode parts are connected together via interconnections and resistances in order to apply differing voltages to these electrode parts, and that said interconnections and resistances are disposed between said inner column and said outer column.

15. The electron optical lens column according to Claim 1, characterized by the fact that said column unit has an inner column and an outer column, that said inner column is disposed inside said outer column, that said column unit comprises a plurality of said electrostatic lenses, that said electrostatic lenses comprise electrodes for generating electric fields on the inside of said column unit, that said electrodes are attached to the inner surface of said column unit, that said electrodes are equipped with a plurality of electrode parts that are mutually separate, that said electrode parts are connected together via interconnections and switching elements in order to apply differing voltages to these electrode parts, and that said interconnections and switching elements are disposed between said inner column and said outer column.

16. The electron optical lens column according to any one of Claims 1 through 6, comprising a plurality of said electrostatic lenses, and further characterized by the fact that grooves are formed between said electrostatic lenses.

17. The electron optical lens column according to any one of Claims 1 through 6, characterized by the fact that said electrostatic lens comprises a plurality of electrodes, and that grooves are formed between said electrodes.

18. The electron optical lens column according to any one of Claims 1 through 6, characterized by the fact that said electrostatic lens comprises an electrode, that said electrode comprises multiple electrode parts, and that grooves are formed between said electrode parts.

19. The electron optical lens column according to any one of Claims 1 through 18, characterized by the fact that an electron gun chamber is provided at one end of said column unit.

20. The electron optical lens column according to any one of Claims 1 through 19, characterized by the fact that a secondary electron detector is provided on the other end of said column unit.
21. The electron optical lens column according to any one of Claims 1 through 20, characterized by the fact that a flange for attaching an electron gun chamber is provided on one end of said column unit, integrated with said column unit.
22. The electron optical lens column according to any one of Claims 1 through 21, characterized by the fact that a column part, structuring the sidewall of an electron gun chamber on one end of said column unit is provided integrated with said column unit.
23. A scanning electron microscope comprising a lens column according to any one of Claims 1 through 22.
24. An ion beam device comprising a lens column according to any one of Claims 1 through 18.
25. A manufacturing method for an electron optical lens column comprising the following steps:
- (1) A step that coats an electrically conductive material on the inner surface of a column unit, and
 - (2) A step that obtains one set of electrodes for structuring an electrostatic lens through the removal of a portion of the aforementioned electrically conductive material that has been coated.
26. A manufacturing method for an electron optical lens column comprising a step that obtains one set of electrodes for forming an electrostatic lens through coating an electrically conductive material in a specific pattern on the inner surface of a column unit.
27. A manufacturing method for an electron optical lens column comprising the following steps:
- (1) A step that coats an electrically conductive material on the inner surface of a column unit,

- (2) A step that obtains multiple electrodes for structuring one or more electrostatic lenses through the removal of a portion of the aforementioned electrically conductive material that has been coated, and
- (3) A step that connects, via interconnections, those aforementioned multiple electrodes that have identical electric potentials.

28. A manufacturing method for an electron optical lens column comprising the following steps:

- (1) A step that coats an electrically conductive material on the inner surface of a column unit,
- (2) A step that obtains multiple electrode parts for structuring electrodes for electrostatic lenses through removing a portion of the aforementioned electrically conductive material that has been coated, and
- (3) A step that connects, via interconnections, those aforementioned multiple electrode parts that have identical electric potentials.

29. A manufacturing method for an electron optical lens column comprising the following steps:

- (1) A step that arranges interconnections on the outer surface of an inner column unit,
- (2) A step that forms, in an inner column, either before or after the aforementioned step (1), through holes for connecting the aforementioned interconnections with electrodes that are disposed on the inner surface of said inner column,
- (3) A step that fits an outer column onto the outside of said inner column,
- (4) A step that forms, in said outer column, either before or after the aforementioned step (3), through holes for connecting the aforementioned interconnections with outside circuitry on the aforementioned outer column.